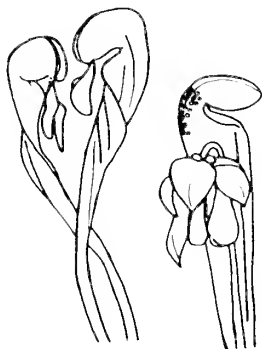


CARNIVOROUS PLANT NEWSLETTER

VOLUME 18, Number 3

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CARNIVOROUS PLANT NEWSLETTER

Official Journal of the
International Carnivorous
Plant Society



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Front cover: *S. leucophylla* with red venation. See feature article beginning on page 79.
Rear cover: *S. alata* with deeper red tops and "red throats." Both photos by Don Schnell.

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your dues to the ICPS>

All correspondence regarding dues, address changes and missing issues should be sent to ICPS c/o Fullerton Arboretum, CSUF, Fullerton, CA 92634. DO NOT SEND TO THE CO-EDITORS. Checks for subscription and reprints should be made payable to ICPS.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.

Copy deadline for the December 1989 issue is September 1989.

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News and Views

Keith Allen (2016 Harvard Ave., Camp Hill, PA 17011) writes:

I thought that the CPN readership might be interested in knowing that CP continues to be seen "in the movies."

In March, I wrote to you about the role that *S. flava* played in "Mississippi Burning." In July, while vacationing & botanizing in the Carolinas, I caught the movie "Weekend at Bernie's." I had been bemoaning the lot of the few remaining *S. flava* that I had seen that afternoon, when, much to my surprise, the movie changed to a scene in a New York restaurant. On each table was a vase with a single pitcher of *S. leucophylla*.

Apparently it is becoming chic (at least in New York) to use the plants decoratively. I have a friend in the design business who has been telling me for years that the plants would work well in arrangements—apparently he was right.

I'm more concerned about where the plants are coming from. Does anyone know about any commercial sources that supply cut plants for the florist trade?

O. Clyde Bramblett (18950 S.W. 136th St. Miami, Florida 33157) writes:

Here's a picture I wanted to share with you of Cliff Dodd and a couple of his *Heliamphora* plants. These are the same plants shown in his terrarium in CPN 17 (2):49 1988 but a year later. The one he is holding is the taller *H. tatei* var *neblina* and the one Bruce Bednar is holding is *H. nutans* with smaller pitchers.



Bruce Bednar (L) and Cliff Dodd (R). Photo by O.C. Bramblett

Extract from New Zealand (Carnivorous Plant Society Journal (Vol. 6, No. 3, December 1988). Mr. **Terry Brokenbro** wrote this letter to the above society: The following is part of a letter received from one of our English members. The questions raised are most interesting and any information and/or photos which members can supply to answer the questions will be appreciated.

"It would be most interesting to see the various *D. binata* of N.Z. and compare them with those I grow. For your information I grow every different form of this complex down to the man-made hybrids. This is apart from any N.Z. forms (assuming they are different).

However, take *D. binata* 'T' form. Many growers do not realise that there are two distinct types of this variant. One has red leaves/tentacles i.e., the colour of *D. binata* var. *multifida*. The other has the green leaves/tentacles of *D. binata* var. *dichotoma* and has the similar larger type growth/structure of this plant. Are those found in N.Z. "red" or "green" type? Perhaps there are both types.

Of the plants found in N.Z. with more than two "points," are they *dichotoma* or *multifida*? If neither, perhaps there is a distinct "N.Z." form?

For your information; the *D. binata* I grow are as follows:

- D. binata* (green leaved 'T' form)
- D. binata* (Red leaved 'T' form)
- D. binata* var. *dichotoma*
- D. binata* var. *dichotoma* (large form)
- D. binata* var. *multifida*
- D. binata* var. *multifida* (extrema)
- D. binata* var. *multifida* (pink flower)
- D. x* 'Marston Dragon'

I understand that World Insectivorous Plants in U.S.A. have a hybrid which is similar to *D. x* 'Marston Dragon,' although I have not personally grown this.

B.S. Couper (P.O. Box 563, Westville 3730, Republic of South Africa) writes:

Having read Mr. Adrian Slack's book *Carnivorous Plants* I was very fortunate to have been able to obtain specimens of various genera, to which I have been able to add *Drosera natalensis* which I have collected from the wild from two locations. One variety collected near Durban has white flowers, the other from near Pietermaritzburg has lilac flowers.

Unfortunately as my interest has grown, Mr. Rolf Rawe of Cape Town, the gentleman from whom I obtained my plants has ceased importing plants and seed and has broken up his own collection. My enquiries as to other suppliers or perhaps even a Carnivorous Plant Society in South Africa have drawn a blank. Furthermore, literature and news is not available locally.

I would therefore like to become a member of your Society and would appreciate it if you could forward information on membership and an application form to me.

The plants I currently have in cultivation are: *Sarracenia flava*, *S. purpurea*, *S. psittacina*, *S. rubra*, *S. leucophylla*, *S. purpurea x oreophila*; *Nepenthes alata*; *Cephalotus follicularis*; *Pinguicula caerulea*, *P. lusitanica*, *P. Primuliflora*; *Drosera natalensis*, *D. capensis*, *D. regia*, *D. cistiflora*, *D. cunefolia*, *D. spatulata*, *D. pygmaea*, *D. leucoblasta*, *D. hamiltonii*, *D. planchonii*, *D. adelae*, *D. binata*, *D. binata* var. *dichotoma*; *Dionaea muscipula*; *Utricularia alpina*.

I intend to propagate and offer plants for sale in the hope that enough interest might be generated for a fledgling Society to be formed locally.

Ed. note: South African members please take note and act!

Robert Gassin (43 Frudal, Knoxfield, Australia 3180) sent this note to us:

"I have been a subscriber to CPN for the past year, and it is only since then I have realized how lucky we are here in Australia. I live in suburban Melbourne. In contrast to many Americans and Europeans, I only have to travel a few miles to see CP's in their natural habitats. Here, several

species are found in the suburbs. Over 100 plants of *Drosera peltata* grow wild in the front lawn of my modest suburban house.

"Within 50 km (30 miles) of the city centre, I have found the following species thriving in suburban parks and wastelands: *D. auriculata*, *D. peltata*, *D. planchonii*, *D. pygmaea*, *D. whitakerii*, *Polypompholyx tenella* and *Utricularia dichotoma*. Furthermore, within 100 km (60 miles) of Melbourne city, these species may be found: *D. binata* (T-form), *D. spathulata*, *D. glanduligera*, *U. australis* and *U. lateriflora*.

"I am an avid bushwalker and along one of my favorite walks in Bunyip State Park 80 km (50 miles) east of the city, I have identified eight local species in a 50 by 50 meter area. This area is low, dry eucalyptus forest and an adjoining swamp. *D. auriculata*, *D. pygmaea* and *D. whitakerii* are found in dry clay soil having a fine surface layer of coarse sand in the eucalypt forest. *D. peltata*, *D. spathulata* and *U. lateriflora* are found in moist soil on the east bank of the swamp in dense undergrowth in full shade. Large stands of *D. binata* and *U. dichotoma* are present in the swamp, growing among reeds and bracken in black sludge.

"From a CP enthusiast point of view, Australia is really 'the lucky country.'"

Mrs. **Lois Glass** (26 Thakeham Drive, Goring, Worthing BN12 5BB England) writes:

Valued Friends! I have just received my journal for March 1989, and I suggest the following two urgent amendments to your list of CP Sources:

p. 29 *Harold Weiner, West Germany*: I have recently seen in the West German Society's Newsletter that Mr. Weiner is now working in Kenya after having given up his nursery—and I had sent money for plants to him just before reading this—I am now waiting to see if my money will be returned!!

p. 31 *W.T. Neale, B.M. & S. Lamb*: Old friends of mine! For health reasons they moved to southern Spain two years ago; and while the cactus collection went too, they are **not** dealing in any kind of plants, let alone carnivores! It is therefore pointless for me to mention their new address to you.

It could be worth your while **adding a French** nursery which was given favourable editorial mention in the French society's journal; I sent for the catalogue and intend sampling their wares if I get my money back from Germany! The catalogue gives a good and varied list of ALL CP families; the prices are reasonable and there is a good discount for paid-up members of the French society:

Nature et Paysages, J.J. Labat
Empouchon, Peyrusse-Massas
F-32360 JEGUN,
France.

They do send overseas, by the way, with phytosanitary certificate of course. I cannot guarantee that they understand or write English, as I wrote to them in their own language!

Randy Lamb (Suite #106, 5030 East Hastings St., Burnaby, B.C., Canada V5B 1P6) writes:

I would like to bring to the attention of other CP'ers a wonderful book put out by the New York Botanical Gardens in which chapter 11 deals with CP and has excellent photographs as well.

Prance, G.T. and Sandved, K.B., *Leaves: The Formation, Characteristics and Uses of Hundreds of Leaves Found in All Parts of the World*. 1985, Crown Publishers Inc., New York. 244 pages.

Marianne Leth (Burgunderstr. 19, 7800 Freiburg, Fed. Rep. of Germany) writes:

Insect-eating plants appeared on the plant market in this small Southwest German city approximately 2 years ago., Sundews and Butterworts comprising most of the available species. *Drosera adelaie*, *aliciae*, *capensis*, and *D. rotundifolia* were readily available; *D. villosa* and *binata* unfortunately came out in a very limited supply. *Pinguicula* x '*Sethos*', *P. agnata*, and *P. esseriana* basically represented the Butterwort family. Last year several pitcher plants became available: *Sarracenia purpurea venosa*, *S. minor*, as well as *S. leucophylla*. The latter,

however, was sold so cheaply in pots full of other moor vegetation that I fear the *S. leucophylla* were simply dug out of wetland areas, stuffed in pots and sold as byproducts because some boggy "wastelands" somewhere were drained and cleared in the name of "progress." A plausible defense of the motto "Save the Environment"?

After some cultivating mistakes in the beginning, most of my specimens are now thriving. I have found invaluable information in Adrian Slack's book, *Insect-Eating Plants and How to grow them* (I have not yet seen the book in German), and my *Pinguiculas*, especially *P. x 'Sethos'* and *P. esseriana*, have not only been blooming throughout the year for two years, but self-propagating to the point where I'm running out of room on my windowsill.

Barry Meyers-Rice (Steward Observatory University of Arizona, Tucson, AZ 85721) has sent in the following comments:

"I enjoyed very much David Butler's article on the New Jersey Pine Barrens a few years back (CPN 14:1). I have spent some time slogging around in the same areas (via hip waders instead of canoe), and saw the large *Drosera intermedia* that he dubbed 'Tree Form'. My impression of these plants was that they were the most tree-like when they were growing among and anchored by their leaves to various emergents and reeds, while their roots were just extending into the water. My personal theory about these plants is that they result from typical intermediates being slowly lifted out of the water as the surrounding emergents grew (or perhaps the water level dropped?). Maybe someone has some observations to substantiate or refute this idea? David did not mention that much of Lake Oswego's reedy shoreline is nearly clogged with aquatic Utricularias: *U. fibrosa*, I think.

"On another subject, I recently spent a few days in Jackson Hole, Wyoming, which is just about 25 miles south of Yellowstone. Here there are only about 60 frost free days a year (July and August), and the average temperature is only 33°F, or so say the rangers. The area is dotted with frigid lakes and ponds. I located some *U. macrorhiza* on the south side of a beaver pond about a quarter mile north of Jackson Lake Lodge. For any future explorers, the runoff from the pond pours into other ponds, and eventually pours over a dirt road that runs from in front of the lodge to Colter Bay. The bladders were enormous (up to 4 mm in length), and ranged in color from clear to black or red. I found only one flower (on July 7th), and the plants were very inconspicuous floating in the water. Good luck in finding them if you are in the area!"

Don Schnell (Rt. 1, Box 145C, Pulaski, VA 24301) came across the following in the June 2, 1989 issue of the TOLEDO BLADE, the newspaper in the city of Toledo, Ohio.

On pages 11 and 13 is mention of the municipal airport expansion and, as a result of surveying the land involved, the discovery of Ohio and at least one US endangered plant species. The article focused mainly on the lupine (*Lupinus perennis*) and its associated butterfly. In passing, mention was made of large numbers of " ... the spatulate-leaved sundew ...," presumably *Drosera intermedia* in that area. The plants occurred along the main runway and an adjacent sandy area.

The airport is located in a portion of the county (Lucas) known as the "oak openings area," a distinctive phytogeographic association in which rather evenly spaced oaks are found in sandy soils among grasses and wet areas. Oak Openings Municipal Park which is maintained by the City of Toledo is nearby. Some years ago I received word of "a sundew" in several herbarium sheets from the park collected in the 1940's but never traced them down.

Readers will recall the report on new locations for *Sarracenia oreophila* (two locations) in Clay County, NC, immediately adjacent to the "older new" locations in Towns County in extreme northeast Georgia. This was a Lit Review in CPN 17:28, and the original article was Castanea 52:310-311. One of the locations was very poor and the other is the largest yet found for this species, but was threatened by farming development.

There is good news! The July/August 1989 issue of the NATURE CONSERVANCY MAGAZINE (39:30) reports that the Conservancy has purchased the eleven acre better site in Clay County for protection.

Gordon Snelling (329 1/2 W. Palm Ave., Monrovia, CA 91016) writes:

I first became interested in C.P. in elementary school, but after several futile attempts at keeping the infamous store bought Venus Flytrap alive, plus one shot at *Darlingtonia*, my interest in these plants became somewhat less intense.

During this time I devoted my energies to my other interests of Herpetology and Entomology, I'm currently in school majoring in Zoology with special emphasis on Entomology. However, the interest in C.P. never really died and few years ago while flipping thru a biological supply catalog I decided to try my hand at C.P. again. I purchased some *D. capensis* and *D. rotundifolia* which actually did very well. This success, along with some diligent letter writing to track down the I.C.P.S. has brought me where I am today.

Today I am growing in excess of 100 species of C.P. and that number is steadily increasing. I am fortunate to live in sunny Southern California, so I'm able to grow my plants out doors year round, the only special treatment they need is constant watering in warm weather, some shading to prevent burning during very hot spells and moving frost sensitive species to shelter during cold spells. So far even *Darlingtonia* has done well under these conditions.

While I find all species interesting, and have pretty good collection of natives, I'm especially attracted to the Australian tuberous and pygmy sundews so I've been working to increase my collection of these species, however, since I grow mostly from seed, I've found patience is a very important requirement for success.

One of the biggest thrills I get is watching seeds germinate and seeing the resulting seedlings grow into mature plants capable of reproducing themselves. I'm constantly checking my seed pots looking for that tell tale hint of green that indicates another life is beginning.

You'll find that I'm a rather outspoken critic of hybridization, not just C.P. but all species, plant or animal; I personally feel that it has no place in this or any hobby, and the only place it really has any value is for scientific research and even then it's borderline.

I feel our goal as C.P. hobbyists should be to do all within our power to preserve this unique form of life. The odds may at times seem overwhelming but so far we've done a job to be proud of.

The most important thing I see is the mass production of many species so it's no longer really required that we obtain our specimens from wild populations.

I have been a member of the I.C.P.S. for about three years now and have found it to be quite rewarding, not only in terms of knowledge and plants gained but also in personal contacts I've made as a result of my association with the group. I am looking forward to having this relationship last for many more years.

Good growing to all of you.

Want Ads

Ernest Taniguchi (45-1040D Waialele Rd., Kaneohe, HI 96744-3153).

WB: "Plants That Eat Animals," by J.H. Prince. Lodestar Books (New or Used in good condition).

Chas. Powell (2138 Harrison St., Santa Clara, CA 95050 USA) (Trade or Sell): *Nepenthes alata* - \$15, tubers of *Drosera erythrorhiza* and *D. stolonifera* - \$7, various *Sarracenia* species and hybrids - \$4 & \$5 ea, *Utricularia biflora* - \$3 ea and many other CP in limited numbers. (Want - Buy or Trade): *Pinguicula vulgaris* f. *alpicola*, *P. vulgaris* f. *bicolor*, *P. crystallina*, *P. hirtiflora*, *P. longifolia*, *P. vallisneriifolia* (I would like to correspond with anyone growing the European pings), *Pinguicula kondoi*, *P. cyclosecta*, *P. crenatiloba*; *Drosera petiolaris*, *D. pilosa*, *Utricularia unifolia*, *U. calycifida*, *U. nelumbifolia*, *U. endresii*, *U. praetermissa*. (I would also like to correspond with anyone growing large epiphytic bladderworts).

Instructions for 3-D Photos on Pages 77 & 84

By J.A. Mazrimas

Place your nose on the page between the left and right picture and slowly pull the page away from your eyes forming a third image in the middle between the pictures. Try to ignore the right and left images and concentrate on the third image which is at first out of focus. Try to focus this third image holding the page about 15 to 18 inches away from your eyes. In about 10 to 30 seconds, a new, in focus, image will suddenly appear which will now have a 3-D look to it. Hold the page very steady when focus is achieved. People who wear contact lenses or have astigmatism may experience some difficulties in doing the above gymnastics with their eyes.

Ed. Note: These instructions were placed here to avoid too much text on the same page.

French CP Books

1) Les Plantes Carnivores comment les cultiver.

Adrian Slack (in French)	172 pages
Editions Diagonale - Levy	ISBN 907470-00-0
3 rue Auber 75009 Paris	129 F.F.

2) Comment choisir et cultiver vos plantes carnivores

Marcel Lecoufle (in French)	144 pages
Editions Bordas	ISBN 2-04-018457-0
	N 200 F.F.

3) Nature et culture des plantes Carnivores (for May end) by Baffray, Brice and Danton.

Editions Edisud	
La Calade (in French)	
route Nationale 7	
F-13090 Aix-en-Provence	
(France)	160 F.F.

Our thanks to Jacques Haldi (Case postale 724, 1212 Grand-Lancy 1, Switzerland, Tél. 022/794 51-79) for this information.

SPECIAL NOTICE

CP SOURCE LIST ADDITIONS AND DELETIONS

World Insectivorous Plants announces that it will end its retail business on December 1, 1989. All correspondence received after this date will be returned to the sender. WIP will continue its vast wholesale market under a different name.

Added to the list of CP sources is: Charles Powell, 2138 Harrison St., Santa Clara, CA 95050. Write to him for current catalogue.

Overwintering Dormant Carnivorous Plants

By Terry Brokenbro, 14 Hood Rd., Rainham, Essex, United Kingdom RM138AS

In the United Kingdom, more losses of stock plants occur during the dormant winter months because of our damp moisture climate allied with low light levels. Consequently, dormant CP are apt to develop mold symptoms for no apparent reasons and they are most devastating to the dormant buds of the *Drosera* family.

The following methods may be worthy of note for those who have plants that suffer similar fates in more or less identical winter conditions:

The Water Immersion Method

Normally, one would reduce the amount of watering to a dormant plant by a considerable amount during the winter months but if *Botrytis* (fungal) attack continues, a complete opposite approach should be considered. Any large container should be filled with rainwater and the dormant plant, pot and soil medium should be totally submerged below the water surface. When growth resumes in the spring, the entire pot and its contents are removed and the plant is once again treated as normal. This method also has the secondary advantage that early spring aphid attacks are reduced substantially. This method may be suitable for other CP genera, but I suggest that spare plants be used to verify that they are suited to such dormant conditions. Thus, it is almost certain that this method should not be used with the Mexican *Pinguiculas* because many of these require completely dry conditions in the potting medium at this time of year.

These, I personally grow in an enclosed, ventilated and unheated propagator to protect the plants from slug and snail attack rather than problems from molds.

The Refrigerator Method

This method I found to be totally successful in overwintering dormant buds of *Drosera linearis* and may also prove successful for other cool-growing species such as *Pinguicula villosa* although I haven't tried it with this species. *D. linearis* has the annoying habit of requiring a continuously cool winter dormancy condition if they are not to break dormancy and rot off due to mold attack because of the low light level at that time of year. For these plants, the water immersion method will not prevent this from happening.

When *D. linearis* goes into dormancy during the middle of November in the U.K., the buds are removed from the soil medium and wrapped in clear plastic bags with a very small quantity of barely damp, live sphagnum moss. They are placed in the refrigerator (not freezer) where a constant temperature of 34-38°F is maintained. This can first be determined by placing a maximum/minimum thermometer on various shelves to locate the ideal temperature range for the storage of your plant buds.

The buds remain for a period of 5 months when they are removed, potted up and replaced in the greenhouse without fail. It should be noted that the period of 5 months is crucial. If it is too early, the plant will be forced into growth prematurely and will be liable to rot by fungal attack. If it is too late, the plant may succumb to a mold that's present on the still dormant buds.

I would like to acknowledge the following colleagues who supplied the basic ideas: On the immersion method, George Sargeant of U.K. from whom the idea came, from Adrian Slack of U.K. with regard to overwintering *S. psittacina*. On the refrigerator method, Rob Maharajh of Canada with whose idea I managed to overwinter *D. linearis* for the first time. I would like to hear from other growers regarding overwintering methods and individual ways of safeguarding CP no matter where they live.

Special Request

By Michael Szesze, Director, Arthur Storer Planetarium, 547 Beech Dr., Lusby, MD 20657
310/535-2917 or 301/8550-1521

I am a planetarium director, teacher and avid CP enthusiast. Our planetarium has a lobby full of CPs, especially Venus Flytraps. I have been working with carnivorous plants and children in schools for several years. Among other things I visit schools and make presentations with living CPs, conduct lab activities, and loan out several terraria for classroom exhibits. Our quite successful efforts have met much enthusiasm in the schools. I have been asked by several professional educator's groups to present these activities at their national conferences.

I am current producing a Teacher's Guide to Carnivorous Plants and will be presenting it in workshops at the Maryland State Science Teacher's Conference and the National Science Teacher's Conference. This guide contains general information on CPs, culture and propagation information, demonstrations and laboratory activities, field trip sites, and resources such as suppliers, books, slide sets, videos, etc. During the workshop I hope to have a large variety of CPs on hand, do a slide and video presentation and have the participants try several activities with CPs. All of this is in a personal interest with CPs that goes back to my own elementary school days and an interest to educate the public to the value of conservation of CPs and their habitat.

I have already spent several days in North Carolina visiting various sites and preparing materials for this project, which is still in its draft stages. Becky Merty, the North Carolina State Naturalist has become my guide and friend, Bob Gardner of the North Carolina Botanical Gardens has been of great assistance and Carol Mayes of the North Carolina Nature Conservancy has been very helpful.

Perhaps there are ICPS members who would contribute to the workshop in one or more ways?

May I include you as a source of CPs for teachers?

Would you send 100 of your catalogs/brochures/pamphlets for handouts?

Would you donate a dozen or more CPs for the workshop?

Do you have some 35 mm slides (copyright free) on propagation, displays, habitat destruction that I may use?

Would you donate a poster or picture?

Would you donate a book on CPs?

Do you have suggestions for CP activities with students ages 5 to 25?

I appreciate whatever help the membership would offer. Please contact me at the above address.

SPECIAL EVENT

Ron Gagliardo is in the process of reactivating his retail CP outlet, "HUNGRY PLANTS." He will have a 1990 catalog for \$1.00, and as in the past, will be selling tissue cultured plants. He will be listed in our March, 1990 list of sources. Ron has been trying to reach customers with whom he has not completely settled up or filled orders. If he has not written you, you may write him at his address (1216 Cooper Dr., Raleigh, NC 27607) and he will respond.

Want Ad

Ronnie Spears (218 Bradfield Dr., LaGrange, GA 30240)

WTB: Sizeable *Cephalotus* plants under \$50.00. Contact CP enthusiast in the area of LaGrange, GA.

Australia's Diminutive Jewels:

The Pygmy Sundews

Notes On Their Care And Keeping

By Gordon Snelling, 329 1/2 W. Palm Ave., Monrovia, CA 91016

The pygmy Sundews of Australia are some of the easiest and most interesting C.P. species anyone can grow. Unfortunately, with few exceptions, these *Drosera* are rarely found in C.P. collections. This is too bad, because, aside from being easy to grow, they are attractive and can reproduce like weeds. And yet, in spite of this, they are only rarely available.

These plants are excellent beginner plants. I have found them to be very hardy and adaptable to a wide range of conditions. My plants have tolerated temperatures from 100°F+ down to the mid-20°Fs, with no ill effects. They reproduce easily, either by seed, or with an abundance of gemmae. And, on top of that, a great many species sport absolutely gorgeous flowers.

Pygmy *Drosera* are often divided into two groups: the easy species and the difficult species. I grow species from both groups, and have found no difference in the ease with which these species will grow. Although I can say that the "difficult" species are not quite so liberal in their production of flowers or gemmae. The easy species, on the other hand, tend to produce large numbers of gemmae that are often more than you can handle.

I don't like the easy and difficult designations. My preference is to divide the plants based on their growth habits. I divide them into three categories: rosette, erect, and semi-erect. The first two groups are rather self-explanatory, but the third, semi-erect, requires some explanation. These plants start by sending out erect growing leaves, and as they mature, these leaves fold down around the base of the plant, until the plant has a sheath of leaves around the stem. This presents a rather unique sight, with a mass of silver or white stipules appearing to sit on a base of bright red trap leaves.

I'm fortunate to live in an area of the country which allows me to grow my plants outdoors all year. I water my plants by the tray method. Since it is not unusual for temperatures to reach 80°F or more, even during the winter, I try to keep at least a little water in the trays at all times. While we are on the topic of water, I use distilled or reverse osmosis water. As stated earlier, the pots stand in this pretty much year round, unless weather permits otherwise. The pots should stay moist, but not excessively soggy, and should be allowed to dry some during the cooler months when growth is less vigorous.

Medium

The pygmy *Drosera* are not an especially picky lot when it comes to growth media. The only thing I would not use is live Sphagnum moss, as it will quickly smother these small sundews. I generally use a mix of 50/50 sand and peat. For some species like *D. leucoblata* and *D. androsacae*, pure peat is often suggested. I've found no difference so far between the two types of media, so try your favorite, and use what works best for you.

Housing

Because of their small size, you don't need much to house these little beauties. I generally grow them at density of ten or twelve to a 4 inch pot, although this will depend on the ultimate size of the species being grown. For example, I grow *D. scorpioides* at about 8 per pot (since it is one of the largest species), and I let *D. pygmaea* just do what it wants to do (generally, it carpets the pot with a layer of bright red leaves).

The roots of most pygmies are quite long, so a rather deep pot is preferred. Because of these long roots, I prefer not to transplant them once they are established, but it can be done with care.

Lighting

Because of their small size, these species are excellent subjects to grow indoors under lights. I have had very good results growing them under two 48-inch cool white tubes placed about six

inches above the plants. The major drawback, in my opinion, is that the plants do not usually develop the vivid colors that they would when grown outside in the sun. So, I grow mine outside where they receive full sun most of the day. The only time I move them or shade them is during the hottest part of the summer. As a result, their colors are quite spectacular. One final thing about lights—if you wish your plant to flower or produce gemmae indoors, it is important that your lights are set to mimic the natural cycles of daylight.

Reproduction

There are three methods you may use to reproduce your plants: seed, gemmae, or leaf cuttings. I've never tried leaf cuttings since I have found the other two methods more practical.

In general, pygmy *Drosera* are poor seed producers, although some species like *D. pygmaea* are very prolific and I consider them to be weeds—but pleasant weeds.

Seed should be sown onto the same mix you plan to use for your mature plants and kept damp but not soggy. I place my pots outdoors with my mature plants when the weather permits. Otherwise, germinate the seed indoors under lights.

Most species don't flower until they are at least one year old. Although *D. pygmaea* and probably most of the other small fast growing species will flower in two or three months when grown from gemmae.

The flowers which open in late morning are usually open for one day. They close in late afternoon, at which time they will normally self-pollinate if not pollinated by insects. If at all possible, I recommend that we give nature a hand and brush the open flowers together to effect pollen transfer. This will hopefully produce a greater seed set and allow for greater genetic diversity among the seedlings.

By far the best way to start pygmy Sundews is by growing them from gemmae. These gemmae are actually modified leaves and are produced by the plant in place of the trap leaves as the plant enters dormancy. Gemmae are able to withstand some pretty rough winter conditions. I have found that they are fairly sensitive to dessication and should not be allowed to dry out.

To start the gemmae, I space them evenly on the surface of the chosen medium and place them under artificial lights. As with mature plants, I use two 40-watt tubes. While the gemmae will grow under lower light conditions, the resulting plants are usually small and weak. From conversations with Rob Majarajh (in Canada) and a few other growers, I have reached the conclusion that gemmae grown in low light environment are very prone to fungus attacks. Ideally, when starting the gemmae you should again copy the natural photo-periods. I must confess, being the lazy type I often leave my lights on 24 hours a day and have observed no ill effects. However, one interesting thing I have observed is that when these plants are placed outdoors they start to produce gemmae regardless of the time of year.

Well, there it is. Basically that is all there is to growing these little jewels. Have I convinced you that these plants deserve a place in your collections? If not, here is a final thought. Many of these species have extremely limited ranges making them very vulnerable to the age-old scourge of C.P., HABITAT DESTRUCTION. So, we need to establish as many species as possible in cultivation to avoid their extinction.

Want Ads

Tom F. Kahl (1351 Lake Washington Blvd. So., Seattle, Washington 98144).

T: *N. fusca* for *N. burbidgeae*, *tentaculata* or other.

WB: *N. highlanders* and hybrids, any viable *Nepenthes* seed, *U. purpurea*, *S. oreo* x *leuco*.

Charles Sadler (8447 Wilshire Blvd., Suite 424, Beverly Hills, CA 90211).

WANTED TO BUY: Seeds, cutting, plants, etc. of *Heliamphora* & other *Tepuiana* as well as RARE *Nepenthes*. I am presently successfully cultivating several of these species, though trade material is, at best, limited. Please correspond if you are actively cultivating these species.

CP in 3-D #2
PHOTOS BY R.D. TILBROOKE

(Please see instructions on page 72)



Drosophyllum lusitanicum

A new (and simple) method of Cultivation

By Alexander Mrkuicka, Höpflergasse 6/16/1/4, A-1230 Wien, Tel. 86 18 992, Austria

For the past years I have had some success in growing *Drosophyllum lusitanicum*—which is one of my special favourites—with methods of SLACK or FESSLER, but during the summer I always had problems with watering the plants when being abroad. Either rotting or dried plants were the result.

Not willing to resign, I carried out some experiments with the aim of keeping *Drosophyllum* without the necessity of watering each day.

The main points with *Drosophyllum* are to:

- 1) keep the soil in the pot humid but not wet
- 2) keep the air dry during sunny hours

After some more or less unsuccessful tests, I found a very suitable method by using a modified pot-in-pot system (which is well known among growers of terrestrial orchids) adapted to *Drosophyllum*.

Cultivation:

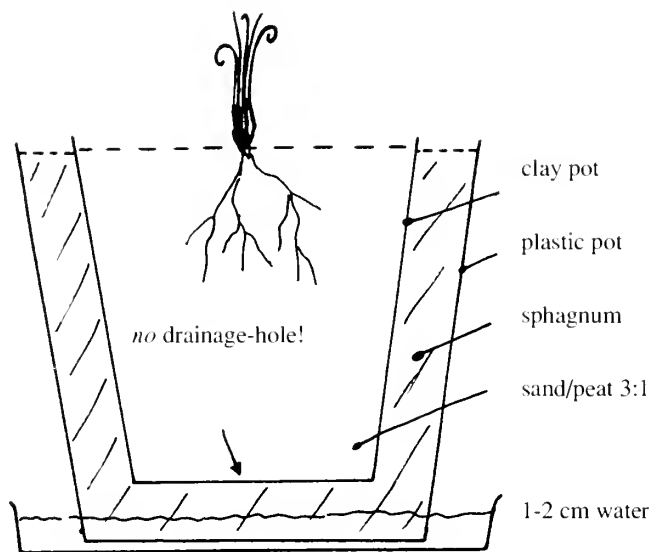
The seed is sown into a clay-pot 13 cm **without a drainage hole** (if not available, close the drainage with silicone or cement—but no plaster!!) in sand: peat 3:1 or, even better:

- 2 parts sand
- 1 part chopped dry *Rhododendron* leaves
- 1 part peat.

After moistening, the pot is wrapped in a plastic bag until the plantlets develop. Then it is set into a 15 or 17cm plastic pot, the space between stuffed with sphagnum.

I keep these “Double Pots” in a saucer with always 1-2cm of water, where the plants grow to a size of 40 cm in two years without getting dry or rot. You only have to be careful about **never pouring water into the clay-pot from above!!**

The sketch will show you the system more clearly than my description:



Sarracenia Alata and *S. Leucophylla* Variations

By Donald Schnell, Rt. 1, Box 145C, Pulaski, VA 24301, USA

Continuing our centerfold series on variations in sarracenias, we now enter the most difficult area. The Gulf coast of the United States extending roughly from east Texas eastward to the central panhandle of Florida contains many large stands of pitcher plants. As is the case with most sarracenia habitat, the number of good, large locations is rapidly decreasing due to the usual factors of habitat destruction for farms, silviculture, housing, industrial and shopping developments. This change has proceeded at an extremely rapid pace in the last ten years or so.

One of the things that most botanists and naturalists quite familiar with sarracenias have noticed for years in this area is the phenomenon of hybrid swarming in large savannas. We all know that pitcher plants hybridize quite easily, and contrary to some minority opinions, most often exhibit hybrid vigor. Plants resulting from crosses into *S. purpurea* are sometimes described as producing more vertical pitchers that topple over easily when filled with water and therefore they would not survive well. I have seen hundreds of these hybrids and they are supported quite well by tall grasses, each other and shrubbery, and contain trapped prey.

At this point we should briefly review some basic genetic terminology. For more details, please refer to a genetics textbook. A simple hybrid between two species, subspecies or forms is called an F_1 . In the case of pitcher plants, the hybrid offspring have an intermediate appearance between the two parents. When a fertile F_1 hybrid is self pollinated, any resulting progeny are termed F_2 . In the case of sarracenias, most of these plants maintain a hybrid appearance indicating that the phenotype of the plant is due to the effects of many genes. In an F_2 situation, one may find a few extreme plants that seem to have more characteristics of one of the original parents rather than have a true intermediate appearance. When any kind of a fertile hybrid is crossed back into one of the parent species, this produces a situation best described as backcrossing with possible introgression for discussion purposes here. A stand of these plants present almost a rainbow of color and form variation.

Introgression may occur in genetically selected fashion. An "introgressed" series of plants which have, for example, *S. alata* (yellow flower) and *S. leucophylla* (red flower) as original parents may not necessarily have the intermediate orange or pink flower—It may tend more toward pure yellow or pure red. If any kind of hybridization, including introgression, becomes genetically fixed so that the plant characteristics breed true by sexual reproduction, then we have a case to argue a new genetic taxon at some level. How this genetic fixation occurs should be read about in that genetics text. One pathway is macorecombination whereby a portion of a chromosome carrying character(s) becomes fixed in each of a pair of chromosomes.

So, what does all this mean? It means you have to keep your eyes and mind open when botanizing this geographic area for pitcher plants. Most earlier botanists and I have found "hybrid swarming" to be much more common and the plants doing well than is suggested by two ecologists who in a semi-popular article and in a yet unpublished long work indicate that in their opinion the hybridization effect is not nearly as common and that the hybrids are ecologically inferior. Further, they state that hybrids occur most commonly in areas disturbed by man. In the first case, I think they have perceived much hybridization and introgression as variation within the basic species of the area due to species and field inexperience. Secondly, of course any seed needs space, light, soil and moisture to germinate and grow to an adult plant. While human disturbance may play a part in modern times, one also has to consider the nature of bunchgrasses and sedges in these savannas. They tend to grow so that there are significant areas of bare ground around the plants. This is hidden when the grasses and sedges grow for years and fall over. But as soon as fire occurs, the bare areas are obvious, sufficient for seedlings of all kinds of species to take hold.

Now that this is all said, is the situation hopeless for identifying probably true genetic variants that will breed true when selfed? I think we can discuss a few with reasonable certainty, keeping



FIGURE 1—A typical plant of *S. leucophylla* with little red venation.

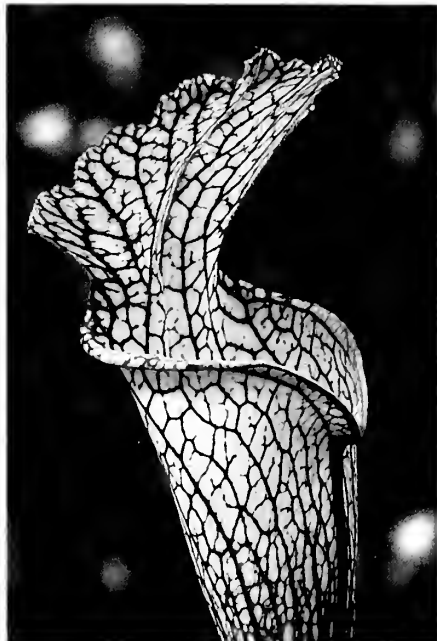


FIGURE 2 AND 3—*S. leucophylla* with more red venation.

(VARIATIONS IN *SARRACENIA AL*)



FIGURE 2 AND 3—*S. leucophylla* with more red venation.



FIGURE 4—Pitchers of *S. leucophylla* with no red; flowers were yellow.



FIGURE 5— Probably introgressive of some other species into *S. leucophylla*, most likely *S. rubra*



FIGURE 6— Typical clump of *S. alata* with mixed mostly green to lightly veined pitchers.

AND *S. LEUCOPHYLLA* by Schnell)



FIGURE 7— *S. alata* with deeper red tops and "red throats."



FIGURE 8— "Stocky, pubescent form" of *S. alata*

in mind that these variants themselves may have originated by hybrid fixation! You have to kind of develop an eye in the field to see what is going on, and to admit that in areas you do not know what is going on. Then, after developing hypotheses, you have to be willing and have facilities to make selfings and crosses and raise thousands of seedlings to at least the stage where you can tell what they are before you dispose of them to make more room.

I will start out with *S. leucophylla*. Figure 1 shows an average “typical” pitcher of the species, mostly “white-topped” (I will try to avoid as much technical jargon as possible) with minimum red venation, the spaces between veins being rather large—Larger than what?, you say. We will see later. The flower in this plant was deep red and had the typical morphology for the species.

In Figures 2 and 3, we still see what I interpret as simple *S. leucophylla*, but with more red venation. Note the expanded top, high and wide hood with broadly ruffled margin. The spaces between veins are still rather large.

In Figure 4, we have the pitcher of what is probably a true genetic variant somewhat parallel to the *heterophylla* situation in *S. purpurea* ssp. *purpurea*. The pitcher top is so pale and the lack of red venation gives the plant an almost ghost-like appearance and it stands out readily in a stand of typical plants, even when not in yellow flower. This plant bore a yellow flower the following spring in cultivation, out of sync with the best pitchers for photography. It is interesting to contemplate how this probable genetic variant maintains its integrity and is not simply swamped by the red-pigmented plants during pollination and fertilization.

In Figure 5 we have an interesting situation. In fact, plants of this sort are often displayed as extreme red venation in the species. One of the large recent books featuring color photos has a plant very similar (and even more like what I think this is) pictured as the species. But note that the pitcher lid is more closely oppressed to the mouth, the pitcher is more narrow at the top, and the veins are more closely knit (That is “more or less space than what?”). This is most likely an introgressed hybrid, probably with *S. rubra* being the other plant involved. I judge *S. rubra* because this plant was not in the *S. alata* range, and by the venation and hood opposition which is very reminiscent of *rubra*.

It is not easy, and it takes a while, but you can have fun making these observations and deductions eventually. Let us consider *S. alata* next.

While most range maps of *S. alata* (including the one in my book!) show the species to be rather continuous across Louisiana into east Texas, there is actually a small break or disjunction of about 50-75 miles between east Louisiana and the Big Thicket of eastern Texas. In the latter area, Phil Sheridan and some local botanists have made some interesting variant observations on this species. We hope that Phil will publish this material soon, perhaps in CPN or in a summary here. Our discussion will be concerned with the eastern part of the range.

In Figure 6 we see a typical clump of several clones of *S. alata* with pitcher coloration varying from nearly all green to moderate red venation. But anyone traveling through southern Mississippi must have noticed the variants shown in Figure 7, those plants of the species with red tops and/or red “throats.” The red coloration of the interior of the upper pitcher opening and hood lining can be so deep it almost appears black. This coloring is, of course, most apparent in full sunlight and good growing conditions. While the variants are a minority they are still common enough to be easily seen. As one might expect, to complicate the situation, hybrids between Figures 6 and 7 do occur. I feel that this character is genetically fixed.

Finally, we have the problem of the “hairy, stocky” *S. alata* which has been discussed and referred to in these pages before. These plants (Figure 8) are most commonly found north of Mobile along US 45, but they are not easy to find the first time. The flower is not remarkable, being typical *alata* in morphology and color. The pitcher is characterized by an average shorter height rapidly broadening into the mouth, giving it a rather “stocky” appearance. Most interesting is the presence of pronounced pubescence (“hairiness”) which can be seen and felt—Typical *S. alata* has a nearly smooth pitcher exterior. My initial impression after observing, growing and selfing these plants is somewhat mixed. I lean toward an unfixed introgression, probably due to *S.*

purpurea genetic influences somewhere in the history of the plant. This would explain the stockiness and indumentum. There is one problem, and I am working on it still. The plants appear in rather large (relatively) uniform stands where they occur, and the *purpurea* influences may therefore be genetically fixed which would indicate at least a form taxon. Some stands have *S. purpurea* growing nearby while others do not, but the last does not bother me since any number of things could have happened to *purpurea* where it might have been and in hybrid seed dispersal.

I will leave you with that incompletely solved problem, and many more you will see for yourself as you gain experience in exploring our Gulf coast pitcher plant stands—while they last!

Herbarium Samples and Preserving CP Specimens

By Randy Lamb, Suite #106, 5030 East Hastings Street, Burnaby, British Columbia,
Canada V5B 1P6

Have you ever tried to describe a plant to another person, or imagine one that they were describing? It is not as easy as it sounds! Human nature being the way it is often causes unintentional exaggeration or misinterpretation. We can all imagine how the stories of giant man eating plants came about! Botanists solved such plant description problems centuries ago by preserving specimens and then storing them in herbariums or “plant libraries” for reference and study (Altschul 1977, James 1950).

The plant press is the “workhorse” of the herbarium and consists of two wooden lattices measuring 30x46 centimetres which have repetitive layers of paper, blotters and corrugated cardboard “ventilators” between them. The layers are arranged so that each plant sample is within a folded paper and ends up with a blotter on either side of it. The ventilators are spaced every two plant layers to speed the drying process. The whole press in turn is held together by a pair of adjustable binding straps. Due to the number of plants collected in the field, a plant press may often end up nearly half a metre thick by the end of the day. Once dry, the plants are mounted with glue or tape to standard 29x42 cm (heavy manila paper) herbarium sheets along with their collection data and are then filed taxonomically and/or geographically (MacFarlane 1985).

Both easy and inexpensive, herbarium samples are an efficient means of documenting and identifying new plants found in the field or for recording species that you grow at home. The advantage of herbarium specimens are that they last indefinitely, the whole plant can be

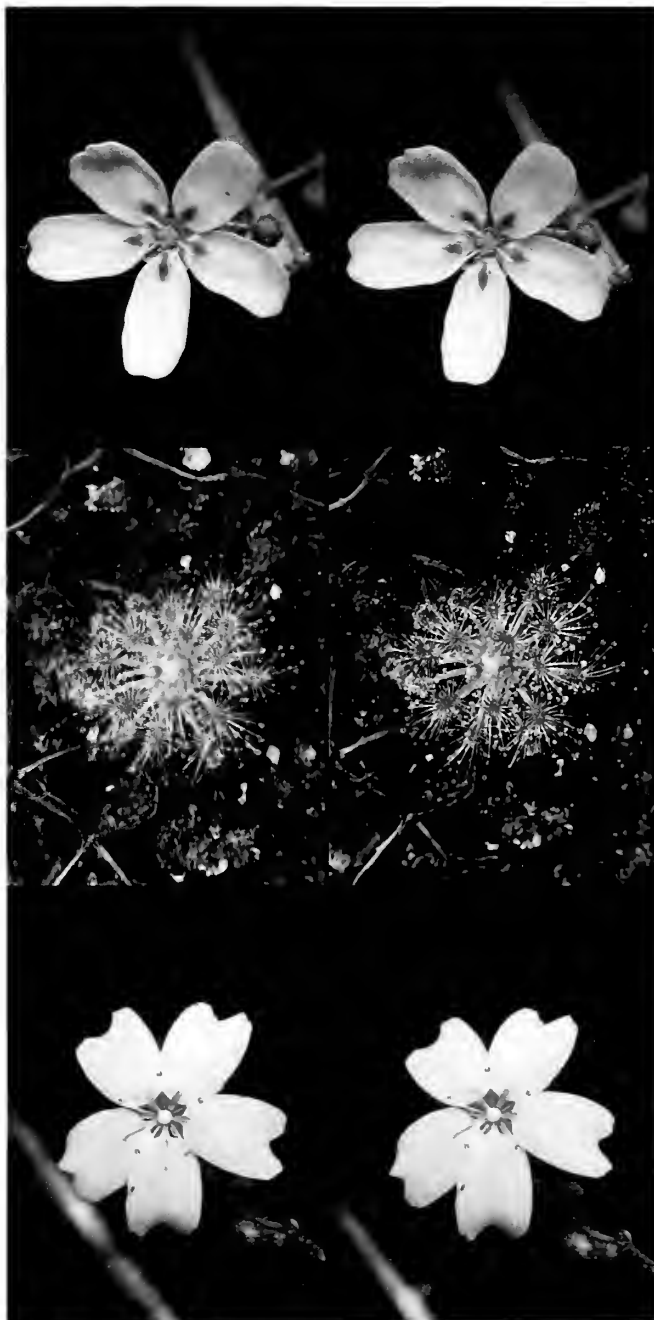
PLEASE SEE SAMPLES ON PAGE 85



Finished laminated herbarium samples and supplies used. Photo by R. Lamb.

CP in 3-D #3
PHOTOS BY R.D. TILBROOKE

(Please see instructions on page 72)



SAMPLES:

continued from page 85

examined closely and the actual size of the plant can be seen. Plant photography definitely has its merits but can often be misleading if not all parts of the plant were photographed or if size references were not included.

Some types of carnivorous plants don't readily lend themselves to being pressed and mounted such as *Pinguicula* and *Utricularia* but *Drosera* is adequate by this method. Other more dimensional species such as *Sarracenia* and *Nepenthes* require extra practice and skill, and are often better suited to alternative techniques such as freeze-drying (Shivas, 1983) or the use of silica gel (Shanos, 1985).

After pressing and mounting several CP specimens, I decided that due to their small size, limited quantity and delicate nature it would be necessary to modify the classical herbarium technique as follows. I found that an old standard sized hardcover textbook of 100 or more pages serves well as a "field press" because it is small, light weight and portable. To prepare your "press" first fold ten or more pieces of note paper in half, insert them separately into the book at equal intervals and then place a couple of rubber bands around the book to keep it closed. The rubber bands will also hold a pencil which you will need for sample labelling.

The leaves, flowers or complete plants with clean roots are placed and positioned naturally into the book's folded papers one at a time. The date, location and species name if known are included on the paper as well and then reinserted back into the book. Unless pressed immediately, the tentacles of *Drosera* will curl and aquatic *Utricularia* will wilt leaving you with specimens of poor quality. Remember to practice pressing and mounting with spare or non-cp plants first so that the more valuable species are not sacrificed unnecessarily. The extra pages between the specimens in the book will absorb most of the moisture, but I recommend transferring your samples to a second book after a day or two to speed the drying process. You will also have an opportunity when transferring the press papers to hold them up to a light to see if the specimens require any repositioning.

After one or two weeks the plants should be dry enough to be removed and depending on their size placed onto unlined standard sized file cards or larger notepaper sized pieces of white cardboard. Although not a standard procedure, I recommend plasticizing the delicate specimens as follows to prevent damage from handling. A piece of clear self adhesive plastic film or laminate that is slightly larger than the card being used is then placed over the specimen and applied carefully to avoid air bubbles. After trimming the excess plastic from the edges of the card, the original collection data is transferred onto its back and your plasticized herbarium sample is completed.

The most impressive herbarium sheets are created by pressing all the developmental stages of a particular species and then mounting them together to show its complete life history (seeds, seedling, adult in flower and seed capsule). You can also combine your best pressed samples with a high quality photocopier and produce your own personalized CP letterhead. The possibilities are endless! The completed herbarium samples will retain their colour for years providing they are kept dry, cool and protected from light. The use of standard sized file cards and note paper sized cardboard for the herbarium sheets allows them to be conveniently stored in file card holders, photo albums or three ring binders. Once the pressing and mounting techniques are mastered and spare high quality samples accumulate, you can trade with other collectors from around the world to create your own CP herbarium.

All of the supplies needed for making herbarium samples can be bought at office and stationery supply stores. The clear self adhesive plastic film can be found under the trade name "Teneka foil" and costs approximately \$3.50 for a 40x100 cm roll. Have fun and the next time you write another CP'er about a particular plant of yours, try using a photocopy of its herbarium sample as your writing paper and knock their socks off!!

PLEASE SEE SAMPLES ON PAGE 86

SAMPLES:

continued from page 85

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Early History of *Drosera* and *Drosophyllum*

By John D. Degreef, 6 rue Libotte, B-42020 Liège (Belgium)

Fossil evidence:

Fossil *Droseraceae* pollens from the Eocene (55-38 MYA) include two types: *Saxonipollis*, with several species in Europe and Asia which must have been early *Aldrovanda*; and the Australian *Fischeripollis haleensis*, may be an ancestor of the local Sundews (since *Drosera* is the only genus in the Southern hemisphere).

The first real *Drosera* pollens appear in sediments from the Miocene (22-5 MYA). The oldest were found in New Zealand (Inferior Miocene) (MILDENHALL, 1980). Other examples are the badly preserved *Droserapollis gemmatus* from Taiwan (HUANG, 1978) and a *Droserapollis* from Germany (KRUTSCH, 1970). The latter site also has yielded the pollen of a late form of *Fischeripollis*, *F. undulatus* (*ibidem*), which one has difficulties interpreting. As a probable ancestor of *Drosera* in Australia, possessing *Dionaea*-like pollen, and given the floral similarities between the Venus' Fly Trap and *Drosophyllum*, the genus (or subfamily?) *Fischeripollis* seems to be ancestral to all terrestrial *Droseraceae*.

We have shown in a recent article [CPN 17 (1988) n°4] that the initial stages of *Dionaea* trap evolution may have taken place under water. Now if this is true of one descendant of *Fischeripollis*, then it also may apply to the others. What is more, the structure of the simplest *Drosera* flowers is almost identical to the one of *Aldrovanda*, the only aquatic among the *Droseraceae*.

Evidence from modern plants:

In contrast with *Aldrovanda* and *Dionaea*, *Drosera* leaves do not tell us much about the origin of their traps. The same goes for regressive leaves which usually still possess ordinary tentacles. The scale leaves of many tuberous *Drosera* seem to be non-specific features with parallels in many unrelated groups, e.g., *Darlingtonia*, *Sarracenia*, *Cephalotus*. The winter leaves in section *Psychophila* (*Drosera uniflora*, *D. arcturi*, *D. stenopetala* and maybe *D. regia*) could be more interesting, but not much has been published on them yet. In *D. erythrorrhiza* previously ordinary plants sometimes produce glandless leaves during one season, then revert to normal (DIXON *et al.*, 1980). This may be a type of regression, but does not tell us much either.

Why do *Drosera* regressive leaves not produce remnants of archaic trap features as in *Dionaea* and *Aldrovanda*? Could it be that the normal tentacles are this genus' original trapping device? There are indeed palaeogeographical reasons for thinking that the sundew stalked glands

appeared during the Cretaceous (135-65 MYA), as will be seen further on. One may wonder why a plant with sticky trichomes had to develop stalked glands, i.e., leaf expansions raising the glands away from the trap surface. Other species with similar trapping devices (*Byblis* and many non-carnivorous plants) work perfectly well with specialized, elongated trichomes only. Comparing again with other plants, the necessity for tentacle motor activity does not appear clear either. In the aquatic ancestors of *Aldrovanda* and *Dionaea* the emergencies' original purpose may have been to entangle debris, which could then be digested by enzyme secretions.

The same mechanism may explain the presence of tentacles in *Drosera*, although picturing the development of an underwater trap in this genus does not go without difficulties. First of all, *Drosera* mucus is either dissolved or precipitated by water (ROST & SCHAUER, 1970). Secondly, the presence of water perturbs the electrical sensory activity of the gland heads (WILLIAMS & PICKARD, 1972, p. 218). One could imagine a slight permanent secretion of mucus, as in many aquatics. When organic debris (or later live prey) would have been captured, the leaf blade would curl around the catch. A much increased secretion containing enzymes would then be produced, the cavity protecting somewhat against the action of the water. The presence of mucopolysaccharides (the constituent of mucus) would increase viscosity, for the enzyme concentration in *Drosera* is too low to produce a viscous fluid. This would prevent the secretion and the digestive products from leaking out of the imperfectly sealed trap.

Aquatic traps could have been produced seasonally when the plant's habitat was flooded. This would explain the cyclic behavior of many *Droseraceae*, and why it was so easy for them to leave the water and to start growing on land. Only then could fast, action potential-mediated movements appear.

The early stages of *Drosophyllum* trap evolution are even more mysterious. The floral similarities with *Dionaea* are evident: the pistil of both species is composed of 5 carpels and is paracarpous in contrast with the syncarpous ovaries of *Aldrovanda* and *Drosera*. These two genera possess 5 stamens, whereas *Dionaea* and *Drosophyllum* have between 10 and 20. If these two species are close relatives, then the *Drosophyllum* trap could also have evolved under water. Its prominent tentacles could again derive from devices for entangling floating debris. The stalked glands of *Drosera* cumulate the functions of capture, digestion and resorption of products. The secretion of enzymes in such structures, which also have to produce mucus, is mediocre. This is compensated by increasing the number of glands in actual contact with the prey through bending of the tentacles. The resorbed nutrients are transported towards the leaf blade by the superficial cells of the stalk, and the usual centripetal conductive system (the phloem) has disappeared here. In *Drosophyllum* the tentacles only capture the prey and inform the sessile glands (FENNER, 1904). They have kept the normal phloem which indicates that during their evolution they never specialized in resorbing anything. Thus they never had to develop motor activity either. The persistence of the phloem shows that this is not an example of lost motor function as is observed in the leaf blade of *Drosera* species with very narrow traps, e.g., *D. filiformis*, *D. binata* (GILBERT, 1984), *D. indica* (?). The abundant secretion of digestive enzymes by the sessile glands of *Drosophyllum* also renders tentacle curvature useless. This may have been true even in an aquatic environment where captures may have been digested and the products resorbed before they had a chance to leak away into the surrounding water. The "toughness" of *Drosophyllum* mucus (DARWIN), its chemical composition being different from that in *Drosera* (SCHNEPF, 1963; ROST & SCHAUER, 1977), the amazing quantities produced, (in a moist environment it is said to really drip off the leaves [Darwin]) may also be archaic adaptations designed to keep the trapping secretions from being washed away by the water. Or have they been developed to cope with the dry environment this species grows in? That it has done so for quite a time is shown by the persistence of the primary root, which is unique among the *Droseraceae* (PENZIG, 1877), and by palaeogeographical data (TERMIER & TERMIER, pp. 312-321).

Geographical evidence:

The first question here is: Why does the Northern hemisphere possess 3 autochthonous genera

of *Droseraceae* (the local sundews are immigrants) and the Southern hemisphere only one (*Drosera*)? The fossil evidence shows that in late Cretaceous times the modern *Dionaea*, *Drosophyllum* and (to a lesser degree) *Aldrovanda* sites were situated on the border between the tropical and subtropical zones. Now the tropics are known to be the most important centers for the evolution of new species. In contrast, the ancestors of *Drosera* seem to have been plants of temperate regions with a more monotonous, less diverse flora. The modern species still tend to avoid really hot climates. When they grow in the tropics, they are usually confined to the mountains or they only grow during the winter.

When examining the ranges of the various sections of the genus *Drosera*, one notices that the most primitive species grow in South America, which must be the region of origin of these plants. The African species are more advanced but cannot match the sophistication of their Australian counterparts. Yet all species possess the same tentacles with only minor physiological differences. This type of trap must clearly have been developed **before** the genus migrated out of South America. If the Australian *Fischeripollis halensis* really is a sundew ancestor, then this migration took place before the Middle to Late Eocene (38 MYA). But how did the American plants reach Australia? During the Cretaceous there existed a land bridge connecting South America and Antarctica. This isthmus only broke up into Scotia, S. Georgia and the Sandwich Islands at the end of that period (TERMIER & TERMIER, p. 208). From there the migration could proceed along the coast of Antarctica. During the Eocene and local climate resembled conditions in parts of modern New Zealand (*ibidem*, p. 295). Australia only separated from Antarctica between 45-43 MYA (*ibidem*, p. 288), but by then *Fischeripollis* was already growing in the Hale Basin. Such an Antarctic migration may seem fantastic, but this route is also accepted for the Marsupials. The Australian beech *Nothofagus* made the reverse trip and reached South America during the Cretaceous (*ibidem*, pp. 284-288).

An interesting though not very specific marker of *Drosera* migrations is revealed by naphthoquinone analysis. It appears that the American and Australian sundews contain the same substance as the other *Droseraceae*: plumbagin. There are sporadic exceptions (*D. hamiltonii* and *D. filiformis* 'tracyi'), which have 7 methyljuglone instead. Quite significantly, so do all African sundews belonging to section *Drosera* (ZENK *et al.*, 1969). Given the rarity of the methyljuglone mutation elsewhere, these must all be descendants of a single species! The only other autochthonous *Drosera* is *D. regia*. So it appears that only two species (maybe three) managed to reach Africa from South America, which shows how difficult the crossing must have been.

The last terrestrial contacts between the two continents occurred during the late Cretaceous when the equatorial part of the South Atlantic, which was stuck between Brazil, Africa and the Rio Grande-Walvis Rise, dried up occasionally (SCLATER & TAPSCOTT, 1979). This seems to be the right moment for the *Drosera* migration. The *Droserapollis* which appears in Europe during the Miocene must have been a descendant of these plants which immigrated from Africa as some contemporary animals did (TERMIER & TERMIER, p. 303).

After the late Cretaceous migrations, the *Drosera* populations of South America, Africa and Australia evolved independently. The Eocene was a warm and humid period during which many new species probably appeared. Then the world climate deteriorated. Australia, and to a lesser extent Africa, also drifted straight into the arid subtropical zone. The drier the climate, the more extreme the sundew forms which survived. This explains why the modern Australian *Drosera* are so different from their ancestors, the African species less so, whereas South America has preserved some archaic forms virtually unchanged.

An astonishing point is the simultaneous appearance of *Droserapollis* on continents which in principle were totally isolated. Did the *Droserapollis* pollens belong to drought-resistant species which already existed mixed among the *Fischeripollis*, and which became dominant due to the climate changes as happened in many herbaceous families (NIKLAS *et al.*, 1980)? Or did we overestimate the age of the *Drosera* migrations out of South America? There was an important increase of the eastward oceanic currents (and winds?) at the end of the Eocene (MARTIN, 1982,

p. 629). This could have allowed previously impossible intercontinental migrations. Then *Fischeripollis halensis* would not be an ancestor of *Drosera*. But post-Eocene Australia was rather arid already, and it is doubtful whether unprepared *Drosera* immigrants could have held out there. The present diversity would also be astonishing if there had not been an Eocene multiplication of species before the onset of aridity.

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NEXT: EVOLUTIONARY PATTERNS IN *DROSERA*

International Carnivorous Plant Society

Seed Bank

August 19, 1989

Byblis liniflora (6); *Capsella bursa-pastoris* (non CP); *Dionaea muscipula*; *Drosera aliciae* (10); *D. arcturi* (5); *D. binata* (14); *D. burkeana* (10); *D. burmanni*; *D. capensis* (10); *D. capensis* (narrow leaf); *D. capillaris* (11); *D. dielsiana* (9); *D. erythrorhiza*; *D. erythrorhiza*; *D. erythrorhiza squamosa*; *D. filiformis filiformis* (NJ); *D. glanduligera*; *D. intermedia*; *D. intermedia* (S. Carolina) (7); *D. lovellae* (2); *D. lowriei* (2); *D. natalensis* (10); *D. rotundifolia* (British Columbia); *D. rotundifolia* (Czechoslovakia); *D. rotundifolia* (Lowland-Czechoslovakia); *D. spathulata* (kansai) (1); *D. spathulata* (kanto) (1); *D. stolonifera humilis* (10); *Drosophyllum lusitanicum* (5); *Nepenthes ventricosa* (6); *Pinguicula ionantha* (1); *P. lusitanica* (1); *P. vulgaris* (Norway) (1); *Sarracenia alata*; *S. flava* (10); *S. flava* (typica); *S. leucophylla*; *S. leucophylla* "chipoca"; *S. oreophila* (6); *S. purpurea purpurea* (Maine); *S. purpurea venosa* "Louis Burke" (1); *S. rubra gulfensis* (5); *S. rubra rubra* (9); *S. rubra wherryi*; *S. alata* x *minor* (5); *S. flava* x *purp.* x *flava* x *purp.* (3); *Utricularia pentadactyla* (10); *U. uliginosa* (2).

For updated information on the Seed Bank inventory, please contact Gordon C. Snelling 329 1/2 W. Palm Ave., Monrovia, CA 91016, USA. Please include S.A.S.E. or return postage. Overseas include 2 international reply coupons (IRC's)

Literature Review

ANDRIKOVICS, S., L. FORRO and E. ZSUNICS. The zoogenic food composition of *Utricularia vulgaris* in the Lake Fertő (Hungary). Opusc. Zool. (Budap) 23(0): 65-70. 1988.

The author examined 1000 traps of the above *Utricularia* and found 19 different species from 9 major taxonomic groups with most of the prey belonging to the Copepoda and Ostracoda. The traps never contained any protozoa or rotatorians. About 2/3 of the traps contained some prey.

DOW, PATSY. 1989. Sowing seeds ... and a lot more. Mobile Bay Monthly 4:17.

This is a short popular article about eleven-year-old John Douglas who has explored Mobile and Baldwin Counties, Alabama in depth with his father and local naturalist J.C. Moore. Mr. Moore was John's early mentor concerning ecologic and conservation problems in the area. John has since developed an intense and knowledgeable interest in the local CP. There is mention that John has promised CPN an article. This story is accompanied by two black and white photos in the field. DES

FOLKERTS, GEORGE W. 1982. The gulf coast pitcher plant bogs. American Scientist 70:260-267.

Somehow we missed this article when it first appeared. I ran across it in the bibliography of Juniper, et. al., *Carnivorous Plants*. It is more than the usual popular article, written for a magazine that aims for the intelligent layman with an interest in science.

The article begins with a description and broad location map of the gulf coast pitcher plant bogs (there being some discussion on what to call the locations), and then comments on the general ecology of the areas. The article quickly swings into CP, and then specifically sarracenias with good discussions on competition, carnivory, hybridization and hybrid swarms and any meaning these may or may not have in the ultimate scheme of things, pitcher plant insects (my

grass cutting wasp is still not mentioned here, either!), and how the habitat is maintained and what, if anything, pitcher plants contribute to it as a whole. The article concludes with some comments on the future of the bogs. The dismal picture painted is certainly coming true as evidenced by changes over the seven years since the paper was printed.

The article is very well written, and in addition to the small orientation map, is accompanied by eight excellent color photos and a bibliography. DES

FOLKERTS, GEORGE W. and DEBBIE RYMAL FOLKERTS. 1989. Unique capsule dehiscence in *Sarracenia leucophylla* Raf. and a hypothesis concerning post-anthesis tilting in *Sarracenia* flowers. *Castanea* 54:111-114.

Seed capsules in most *sarracenias* split or dehisce at the apex ("umbrella" end) of the seed capsule. However, the authors note that in *S. leucophylla*, splitting occurs at the base of the seed capsule. This is felt to be a derived condition since all other species have apical capsule splitting. The authors postulate that this may help in getting shed seed clear of the umbraculate cup of the retained style. They also hypothesize that tilting of the flower back towards a more erect position after anthesis allows seed to generally clear the "umbrella" in all *sarracenias*. DES

HUGO, NANCY ROSS. 1989. A fly in their soup. *Harrowsmith* 4:58-67.

This is a well done popular article in a newer magazine that covers various subjects, mostly related to home, garden and nature. The article primarily tells about ICPS member Phil Sheridan and his efforts in locating CP (mostly pitcher plant) habitats in Virginia. The state has relatively few recorded collections of *sarracenias* and most of these sites have not been seen for years. Phil has been searching them out as well as locating new bogs containing CP. While his job is in Fairfax, he commutes two hours every day to his home in east central Virginia on a quarter acre of wetland on which he has naturalized many CP. The author discusses American CP in general, including some history and function. There are 12 excellent color photos, including one of Phil, and a sidebar with photo on how to naturalize or grow CP in pots outdoors.

JANSSEN, A., The flora of the savannas of Humaitá, Amazonas. *Mitt. Bot. Staatssamml. Muench* 27(0):87-96. 1988.

Five new species of *Utricularia* were found in the Amazonas region: They are *Utricularia viscosa*, *U. ocesta*, *U. hirtella*, *U. simulans* and *Genlisea filiformis*.

JOEL, DANIEL M. 1988. Mimicry and mutualism in carnivorous pitcher plants (*Sarraceniaceae*, *Nepenthaceae*, *Cephalotaceae*, *Bromeliaceae*). *Biological Journal of the Linnean Society* 35:185-197.

The material in this paper is pretty well covered in the chapter on mimicry in Juniper, Robins and Joel, *Carnivorous Plants*, and summarized in the recent CPN article (CPN 18:12-14), where the author comes to essentially the same conclusion. DES

MACROBERTS, MH and BR. 1988. A note on *Sarracenia purpurea* L. in Louisiana. *Phytologia* 65:191-194. 1989.

The authors researched older reports of *S. purpurea* in Louisiana where it apparently does not occur today. They confirmed two older herbarium specimens (1842, 1970). The plants were originally found in St. Helena and St. Tammany Parishes. They are no longer found here, but intensive botanizing may turn them up again. DES

NELSON, E.C. *Dionaea* D. Solander ex J. Ellis (*Droseraceae*): Notes on the nomenclature and typification of Venus's flytrap. *Bot. J. Linn. Soc.* 99(3):249-254. 1989.

The binomial, *Dionaea muscipula*, from the Carolinas in the USA was first published in a London newspaper in September 1768 by John Ellis who credited the generic name, Venus's flytrap, to Daniel Solander.

RENNER, SUSANNE S. 1989. Floral biological observations on *Heliamphora tatei* (Sarraceniaceae) and other plants from Cerro de la Neblina in Venezuela. *Plant Systematics and Evolution* 163:21-29.

The author spent a month on this large tepui located on the Brazilian-Venezuelan border studying pollination of various plant species, among them *Heliamphora tatei* var. *neblinae*. The paper should be read for detail which includes ecological notes of locations including elevation, temperatures, soil, water, etc. In summary, the *Heliamphora* has a porocidal anther that requires "buzz" pollination; that is, rapid wing vibration of visiting pollinators to cause release of the pollen through the slit-like terminal pores. Contrary to a supposition by Gibson that moths may be involved in pollination (see CPN 17:47, 1988, as pointed out to me in a note from Renner), and Maguire who thought that birds were major tepui pollinators, this author has shown that various species of bees, particularly bumblebees of the area, are the chief pollinators. They were seen to visit the pitcher plant flowers, "buzz" them, and induce pollen shedding. The author confirms this reviewer's observation that pollen does not spontaneously shed from *Heliamphora* anthers, and certainly moths and birds cannot produce the "buzzing" effect. The author detected no flower fragrance in the field, and no floral nectar production. DES

RUFFIN, LISA: 1989. Classics with American style. *American Horticulturist* 68:32-34.

This article is about a floral arranger based in Houston. The main reason for reviewing it is because of a photo of an extensive arrangement containing cut pitchers of *Sarracenia alata*. We have heard from various sources about the increased use of pitcher leaves by florists all over the world. As a consequence, a cottage industry of collecting "stems" of pitchers has grown up all over the Gulf coast and apparently thousands of pitcher leaves are collected annually.

There has been little study on how this may be impacting on pitcher plant populations. Theoretically, if only one pitcher is cut from a plant bearing two or more pitchers only (no collections from one-pitcher plants), and trampling of the location is limited, there should be little problem. However, human nature dictates efficiency and speed even in a cottage industry, and collectors may be tempted to clip off all pitchers from a rhizome and to show little regard for other plants in the area. There is some indication that limited harvesting of pitcher leaves from anyone rhizome may stimulate additional leaf growth, but one wonders at what cost to rhizome storage.

The opinion of this reviewer is that use of field collected pitchers for this purpose should be strongly discouraged, particularly since worker activity is probably not closely controlled. I do not feel that a national magazine of the stature of *American Horticulturist* should appear to endorse use of increasingly rare CP collected haphazardly and massively for floral arrangements. DES

Special Announcement

- Dues for 1990 will remain unchanged.
- Please forgive the delays in handling your orders and requests. As your business manager/managing editor, who puts CPN in final form and mails it has had to move twice this year (May-June & November)
- December issue will include a directory of current ICPS members. Please send all corrections by 30 November 1989. If you do **not** want your address published, please notify ICPS. We will edit out names of people who so indicate their desire for privacy on their application forms.

CP Societies Around the World

Ed. Note: As CPN approaches its 19th year of publication, we will begin a series of articles reprinted where possible from their respective journals. Also, the Co-Editors would like to solicit articles giving a brief history and other information from other CP Societies. Please send them to Joe Mazrimas.

Here are two to start—The (British) CP Society which publishes The CPS Journal and The CPS of NSW (New South Wales, Australia) which publishes the Flytrap News.

The Carnivorous Plant Society



EDITOR'S NOTES

(reprinted from The CPS Journal 12 (Spring, 1988):1-2)

Welcome to the tenth anniversary issue of the Carnivorous Plant Society. And what better time to reflect on the past.

The original committee of John Watkins (chairman) Alistair Mackie (secretary), Terry Brokenbro (treasurer), Philip Norris (editor), and David Taylor launched the Society in a blaze of publicity. Features about it were run in newspapers, on radio and television programmes. John Watkins was still only a sixth-former at school, but much of this imaginative launch was down to his single-minded enthusiasm. The committee soon established regular monthly meetings, the twice-yearly Journal, two or three newsletters a year, a small library, and carnivorous plant displays at Wisley Flower Show and at Chelsea Flower Show. There can be few other amateur organisations that got off to such a flying start.

The succeeding committee have consolidated this early work. The Chelsea Flower Show is our annual back-breaking event, with an eye always on an elusive gold medal. Meetings now include field trips to such places as the New Forest and Kew Gardens. Plant/seed search and a writing link-up between members have been started. But essentially we have reached saturation point. All the present committee have to fit Society work in between demanding occupations — cancer research, Ph.D. studies, computer programming, laboratory support, insurance, and television directing. We now know that 400 members is the limit of our capacity, particularly for the secretaries who have to deal with enquiries, membership renewals, mailing all newsletters and Journals, and helping organise Chelsea. And this editor knows that he cannot find time to do more than two journals a year (and that's a struggle).

From an 18-sided booklet containing 4 illustrations, the Journal itself has steadily improved. We've added 10 extra sides of text, 21 illustrations (in the last edition), including photographs. Instead of photocopied typewritten sheets, we now print offset on blade cartridge paper, giving good reproduction of photos, and a gloss. But although the membership has increased from 120 to

400 the costs of printing have outstripped our subscription income — ordinary membership has only risen from £2.5 to £6.00 per year since 1978. Extra revenue is raised partly from advertising, but mostly by selling booklets at the Chelsea Flower Show.

So for our 10th birthday report, I would say that we are fit, have the right number of members, and are improving the quality of activities each year. Luckily each time one of the committee has left, another dependable worker has always filled their place. And to all those past committee members, we thank you for getting us so well established. Let's hope that the editor in ten year's time can sit back as self-satisfied!

Secretaries: Dudley and Margaret Watts, 174 Baldwins Lane, Croxley Green, Herts, WD3 3LQ.

A BRIEF HISTORY OF THE CARNIVOROUS PLANT SOCIETY OF NEW SOUTH WALES, AUSTRALIA

(reprinted from Flytrap News Supp., January, 1988)

The Society came into being following a meeting called by Rob Charnock and held at Ian English's nursery at Kenthurst. A large group of interested people attended and at the end it was confirmed that enough people were interested in starting a club for CP growers to get it off the ground. Another meeting was held at Ryde Horticultural College and the Society came into being. The year was 1985 and the Society officially existed from June of that year.

In September 1985 we entered our first "show" at the Sydney Botanic Gardens "Spring in the Gardens." Considering no one knew what they were doing we put on an interesting (to the public) show. By September 1986 we had learnt a lot about putting on shows. This time we did an aesthetically pleasing display and we won the first prize. This helped us to become financially secure—something we had not been up to this point. We also branched out to put on a display at Wyong Exotic Plant Expo.

In 1987 we entered 3 shows: Spring in Gardens, Sydney; Exotic Plant Show, Wyong; Penrith Garden Club, Penrith Mall. We won 2 outright firsts and 1 first in section. All had prize money which helped give the Society its 'free' Christmas Party and keeps us financially in the black!

Lively and interesting meetings with business being as brief as possible. Speakers or a "hands on" practical demonstration. The meetings are held on the 2nd Friday of the month except for February and April (school holidays) when they are held on the 3rd Friday. For 1988/89 the dates are as follows:

February - 19th	March - 11th	April - 15th	June - 10th
August - 12th	September - 9th	October - 14th	November - 11th

Meeting place is Ryde Horticultural College, Parks Rd, Ryde (parking available) phone Secretary (Cecily) or Vice President (Daryl) on 669.6141 for details. Meetings commence at 7.30 pm ending at 10 pm. Transport can be arranged if you phone Cecily or Daryl. If you wish to attend a meeting and you are from out-of-town accommodation can be arranged ... again phone Cecily or Daryl.

Our ANNUAL GENERAL MEETING is held at the June meeting. Our CHRISTMAS PARTY is held in December (usually 2nd Sunday). We exhibit at shows during the year and hope to hold our own show during 1988/89 if enough members are interested. We are also trying to find the time to help set out rules/regulations for a show to be run in conjunction with the Royal Easter Show. We have built up a good rapport with the Botanic Gardens staff interested in CPs.

During 1988/89 the Secretary/Vice President are trying to visit members who live out of town, but within NSW ... they have been north to Port Macquarie/Woolgoolga and hope to visit others

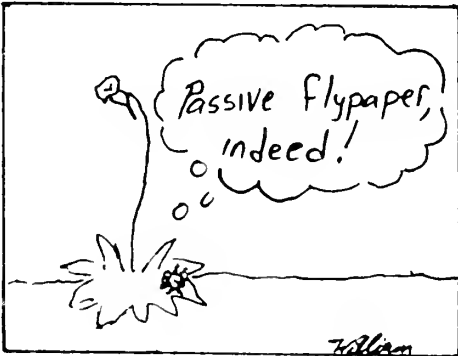
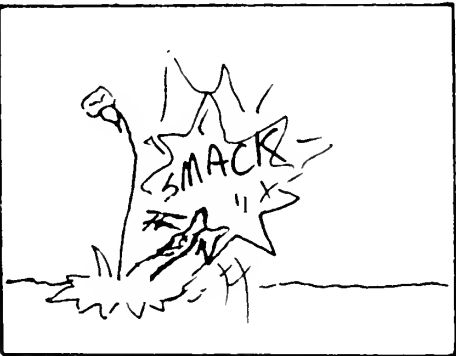
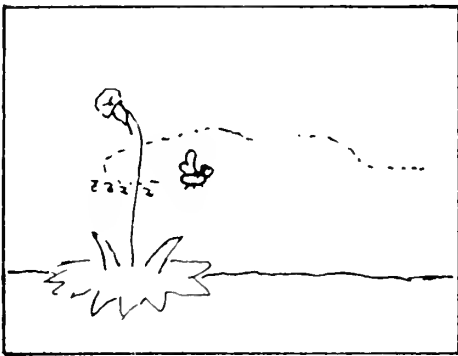
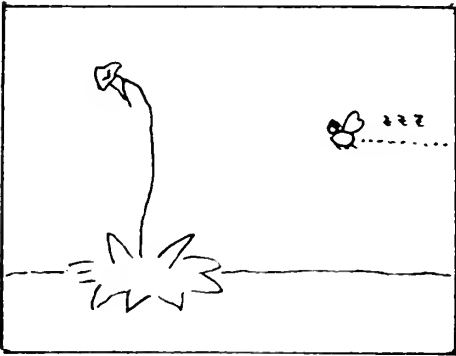
at Newcastle and Goulburn/ACT. If you would like a visit please drop a note in the mail and arrangements can be made and then you can ask any questions you have. Hopefully at a later time this service can be extended to other States.

CP Society of NSW, The Secretary, P.O. Box 111, Redfern NSW 2016, Australia

Ed. Note: For membership information please write to the address given at the end of each article.

Tidbits

from Bill Strand



Want Ad

Michael Waltz (3336 Cedar Ave., Mpls., MN 55407)

WTB: Nepenthes seeds and cuttings, Heliamphora, Cephalotus, Genlisea (plant or seed), Aldrovanda.

